ABSTRACT

The life of a rolling bearing for use in vacuum pumps and the like used under severe conditions of reduced pressure atmosphere, high speed rotation, high temperature and lubricating condition with fluoro-lubricating oil is extended.

By the use of a full complement angular ball bearing (with no cage) with a contact angle from 10 to 45°. preferably, from 15 to 30°, the number of balls is increased to keep the contact pressure between the inner and the outer rings and the balls lower and, in addition, the degree of spin sliding by the fluctuating load is reduced to decrease wear. In addition, the life is extended by defining the surface roughness of the inner ring and the outer ring, defining the roughness ratio of them relative to the rolling element, defining the Cr content in the alloy steel for the rolling element, forming the rolling element with the oxide ceramics, or providing a dense nitride layer on the surface of the rolling element, avoiding the presence of obstacles with a mean diameter in excess of 3 μm on the raceway surfaces of the outer ring and the inner ring, or coating a film of a hardness higher than that of the raceway surface of the outer ring and the inner ring on the surface of the rolling element.